

to greater than 60% of the total nitrogen excreted. In older unfed individuals of *H. anceps*, nitrogen excretion was highest in the 35-day sacrifices. In this species, total nitrogen excretion in older unfed animals ranged from roughly 20 ng N·hr⁻¹ in controls, to almost 100 ng N·hr⁻¹ in 35-day sacrifices, and back to about 45 ng N·hr⁻¹ in the 70-day sacrifices. The proportion of nitrogen excreted as urea by older unfed *H. anceps* ranged from 80 to 95 percent and was highest in the 35-day sacrifices.

These preliminary studies provide important evidence for species- and age-specific physiological profiles in two *Helisoma* species. Importantly, and while there is considerable variation between species, our results are consonant with the paradigm that relative to older conspecifics younger snails have higher rates of protein turnover during diapause. Such turnover, whether it be for maintenance repair or for metabolic energy, may shape the age of first reproduction in temperate mollusk species which have an overwintering diapause state.

SOME PHYSICAL ASPECTS OF NAIAD DISTRIBUTION IN MISSOURI. Alan C. Buchanan, Missouri Department of Conservation, Columbia.

The number of species and living specimens of naiades per site was correlated with physiographic region, stream order and gradient, and local soil type, bedrock type, and relief at 598 sites in Missouri. Both number of species per site and number of specimens per site were significantly positively correlated with stream order, and significantly negatively correlated with stream gradient. Neither number of species per site nor number of specimens per site was significantly correlated with physiographic region, or local soil or bedrock type, or local relief. The highest diversity and abundance of naiades occurs in the Missouri Ozarks where limestone and dolomite comprise a significant portion of the bedrock. The lowest diversity and abundance of naiades occurs in western and northern Missouri in areas of highly erosive soils.

DEVELOPMENT OF A HATCHERY FOR COMMERCIALY IMPORTANT MARINE BIVALVES IN PANAMA. J.W. Ewart¹, J.R. Villalaz², J.A. Gomez², L. D'Croz², and M.R. Carriker¹. ¹College of Marine Studies, University of Delaware, Lewes, Delaware, ²Centro de Ciencias del Mar Y Limnología, Universidad de Panama, Republica de Panama.

Scientists at the University of Delaware and the University of Panama are working together to establish an experimental hatchery for the production of juvenile clams *Protothaca asperimma*, scallops *Aequipecten circularis* and oysters *Pinctada mazatlanica*, *Ostrea iridescens*. The goal of the hatchery is to produce juvenile bivalves to replenish declining natural populations and to foster the development of bivalve aquaculture among coastal fishing families.

Reproductive cycles of commercially important bivalves in the Bay of Panama are poorly understood and appear to be significantly influenced by coastal upwelling which

occurs during the dry season (January-April). Recent results of bivalve spawning trials, histological studies of gonadal development, and assessment of phytoplankton productivity in both natural waters and laboratory cultures are presented.

POPULATION BIOLOGY OF THE PLEUROCID SNAIL, LEPTOXIS CARINATA (BRUG.) IN MARSH CREEK, ADAMS COUNTY, PA. Sherman S. Hendrix, Biology Department, Gettysburg College, Gettysburg, Pennsylvania.

Both living and dead *Leptoxis carinata* (Brug.) were collected monthly from April 1969 to August 1970 using a modified Suber sampler in a tributary of the Potomac River, Marsh Creek, at highway US-30 four miles west of Gettysburg. Each monthly collection consisted of 30 samples of .05m² and included at least one transect across the stream above, within, and below a small riffle. Water depth, velocity, and bottom type were determined for each sample site. Marsh Creek is a typical piedmont bicarbonate stream with calcium ion ranging from 30-68 ppm, pH 7.3, and a cobble bottom predominating in the sampling habitat.

A total of 4684 live and 3225 dead *L. carinata* were recovered. The population exhibited characteristics similar to that reported by Aldridge (1982). Egg laying commenced in late March, peaked in June, and ceased by early August. Laboratory reared eggs hatched in 15 days at 20-22°C and young snails grew to a mean length of .639 mm in one week. Field collected young attained a length of 4.5 mm by the September collection and exhibited a high mortality rate. *L. carinata* became sexually dimorphic by the following summer. The sex ratio in the population was 1:1.

The digenetic trematode *Plagioporus hypentelii* Hendrix (1973) uses *L. carinata* as its first intermediate host. One and two year old males were found to have a significantly higher incidence of infection (7% vs 3%) than females. Infected individuals were usually found below the riffle. The number of daughter sporocysts in the rectum of *L. carinata* varied seasonally, with the peak in the summer months.

THE FRESHWATER MOLLUSKS OF THE HUDSON RIVER BASIN: A HISTORICAL AND ECOLOGICAL SURVEY. D. Strayer, Institute of Ecosystem Studies, Millbrook, New York.

Except for Smith's recent papers (e.g., *Nautilus* 97: 128-131), the mollusk fauna of the Hudson River basin has received little attention. I am using museum and literature records in conjunction with field surveys to describe the distribution, ecology, and historical changes in status of the freshwater mollusks of the basin.

My survey of museum and literature records is nearly complete. Because of the dedication of a few collectors and the vigilance of several museums (ANSP, UMMZ, USNM, AMNH, MCZ), I was able to locate more than 2000 museum lots, most of them from the 19th century.

The Hudson basin's fauna contains at least 82 species of freshwater mollusks, including 21 unionids, 18 pisidiids, 24 pulmonates, and 19 prosobranchs. As Smith has already pointed out, the Hudson served as a zoogeographic gateway between the Atlantic Slope and the Interior Basin, so its fauna